PATENT SPECIFICATION

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COMPLETE SPECIFICATION

Improvements relating to Steam Irons.

We, GENERAL ELECTRIC COMPANY, a Corporation of the State of New York, United States of America, Schenectady 5, State of New York, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement: —

In many present day steam irons, water is fed at a regulated rate from a reservoir to a flash boiler which is usually located in the heated soleplate of the iron. The water dropping onto the hot boiler surface is flashed into steam and then passes ultimately through steam ports in the bottom of the soleplate for assisting in the ironing operation. To iron in the most efficient manner and to avoid any danger of spotting of the material, it is necessary that the water be completely converted into steam before passing through the steam ports. As is well known, water dropping onto a hot metallic surface has a tendency to form into globules which bounce about on the hot surface without being converted substantially instantaneously into steam. It is possible for such globules to be entrained by the steam forming in the boiler, carried through the passages to the steam ports, and ejected as water onto the surface being ironed.

To minimize the above tendency of the water to form into globules and to facilitate the instantaneous conversion of the water into steam, it has been the previous practice to steam each iron after assembly and before shipment in order to secure a satisfactory coating thereon. For such steaming either a solution of gypsum or a solution including a mixture of gypsum and hydrated lime was used. This solution was supplied to the completed iron and the iron was steamed in the usual manner. As the solution dropped onto the boiler surface and the water was evaporated to steam, the gypsum or the gypsum and hydrated lime mixture deposited as a coating on the boiler surface. While this coating reduced the tendency of the water to form into entrainable globules, it had certain disadvantages. In the first place, since the steaming operation for the purpose of coating was performed after the manufacture of the iron was complete, a great deal of the coating material was deposited on the outside of the soleplate on the bottom surface thereof in the area adjacent the steam ports. This required a buffing operation to remove such deposits, and these deposits because of the nature thereof and because of the location of a portion thereof in the steam port recesses, were rather difficult to remove. In addition, these previous coatings were such that the iron would ordinarily start to "spit" at temperatures in excess of about 400 degrees F.; that is, the aforementioned globules would form and be carried out through the steam ports with the steam. Finally, the coating was non-uniform, being heavy in some places and absent in others.

It was also found in some cases that after a period of time this old coating had an occasional tendency to come out as small white flakes, being ejected through the steam ports onto the surface being ironed. This means that the coatings previously used did not in all cases have sufficient adhesion for the purpose. Finally, the coatings previously used were at least to a limited extent soluble under certain circumstances so that if the iron were "flooded" some of the coating could wash out through the steam ports, introducing the possibility of staining the material being ironed.

The present invention provides a steam iron with a boiler having a coating of silica or silica sol which overcomes the above disadvantages and which can be applied to the surface of the boiler by the method of the invention claim 4 before any assembly of the soleplate into the completed iron. Furthermore, the coating material is such that an iron having

[*Price 3s. 6d.*]

Page 25

the boiler surface coated therewith will not "spit" even though the iron is steamed at a temperature over 500 degrees F. Because of the fact that the coating is applied merely to the particular surface of the soleplate upon which it is desired at an early stage in the manufacture of the iron rather than being applied by a regular steaming process in the completed iron, there is no tendency for the coating to be ejected through the steam ports and deposited on the bottom of the soleplate. Therefore it is no longer necessary, as it was previously, to remove the deposited material in a difficult buffing operation. The coating of this invention also has a better adherence so that any tendency for small flakes to pass out through the steam ports during subsequent use of the iron is minimized. Finally it is not soluble in water so that even if the iron should be "flooded" there is no tendency for any portion of the coating to be washed through the steam ports and any possibility of staining the material being ironed is minimized.

It is an object of the invention to provide an improved coating for boilers, and particularly the flash boilers, of steam irons which facilitates the conversion of water into steam and minimizes any tendency of the iron to "spit."

It is another object of the invention to provide an improved coating for the flash boilers of steam irons and a method for applying such coating by which improved adherence to the boiler is secured and any tendency of the coating to flake off or to be dissolved is minimized.

In accordance with the invention a steam iron soleplate having a boiler cavity therein for receiving water for flash conversion into steam, is provided with an adherent coating of silica on the surface of the cavity.

In carrying out the invention in one form a colloidal dispersion of hydrated silica, that is a silica sol is employed; in other words, a liquid medium, such as an aqueous medium, in which the silica is carried as a colloidal dispersion or sol. As used in this specification the term "colloidal dispersion" is not intended to be limited to a particular technical particle size but to indicate the nature of the substance employed. The soleplate is heated to a desired temperature and the portion of the top surface of the soleplate exclusive of the boiler area is masked in any suitable manner. The silica sol is then applied, preferably by spraying to the exposed boiler surface to provide the coating therefor. In practice it has been found that the best results are achieved when the material is applied in a plurality of relatively thin coats rather than in a single coat.

For a better understanding of the invention reference may be had to the following description of the accompanying drawing which is a perspective view illustrating diagrammatically a soleplate being coated in accordance with the invention.

Referring to the drawing there is shown a steam iron soleplate 2, formed with a cavity or recess 3 therein which forms a steam chamber or boiler. Heat for the soleplate and for effecting vaporization of water in the steam boiler is supplied through a heating element embedded in the soleplate. The boiler is closed at the top in the customary manner by a cover which is secured to the top of the soleplate overlying the steam chamber for example by a plurality of screws. Water is supplied from a reservoir through a valve which is secured to the cover at a metered rate, dropping onto the surface of the boiler 3. This surface, being heated by the heating element, effects flash vaporization of the water into steam. The steam passes in a conventional manner through passages to the steam ports from which the steam is supplied to the surface of the material being ironed.

The soleplate is usually made of a metal such as aluminium. If the water is dropped onto a bare aluminium surface, there is a tendency for at least some of the water to collect in globules bouncing about on the hot surface in a well-known manner. Such globules are frequently entrained in the stream of steam passing from the boiler to the steam ports and hence are ejected as water onto the surface being ironed. This, of course, is undesirable for most satisfactory and effective steam ironing. In order to reduce the amount of such "spitting" it has been the practice to coat the surface of the boiler in some manner such as already mentioned.

To overcome the aforesaid disadvantages, a coating material is provided which has improved adherence, no tendency to dissolve and which does not allow "spitting" even at temperatures above 500 degrees F. Moreover, it is possible to apply this coating uniformly and easily by spraying it, for example, onto the boiler surface of the soleplate before any assembly of the iron has begun. The remainder of the top of the soleplate is conveniently masked in a suitable manner so that the deposition of the coating material is limited to the boiler surface. Since by this method and with this coating material the boiler coating can be secured at an early stage in manufacture, it is no longer necessary to perform the final steaming operation and then to clean the iron, and particularly the soleplate, by a difficult buffing operation after this steaming has been completed.

The particular material employed in a coating in accordance with this invention is a liquid suspension which may best be described as a silica sol or a colloidal dispersion of hydrated silica. A very satisfactory composition for the purpose is a silica sol sold under the registered trade mark "Ludox." For application to the boiler surface a mixture is made of about 1 part "Ludox" and 6 parts demineralized water.

The material employed may be considered from a chemical standpoint as a colloidal dispersion of hydrated silica or a polymerized form of silicic acid. "Ludox" is an aqueous dispersion containing approximately 30% SiO_2 with a very small amount of alkali as a stabilizing agent. An approximate chemical composition would be 30% SiO_2. 0.3% to 0.4% Na_2O, and a maximum of 0.15% Na_2SO_4 or other sulphate. It has been found that a percentage of Na_2O as high as 1% may be employed. The composition employed is preferably slightly alkaline. It has been found that there is a tendency toward precipitation when the pH is above 10.5. Though there is considerable stability even at a pH as low as 2.5, it has been found that a pH lower than 7.0 is undesirable because of corrosion of equipment. Moreover, observations indicate that a better adherence and optimum conversion of water to steam are obtained when a slightly alkaline composition is employed; tests indicate an optimum pH range to be from 9.5 to 10.5.

The product used for the coating should be distinguished from an alkali silicate such as the sodium silicate of commerce, because, in contrast to sodium silicate, for example, it contains no significant quantity of alkali and has few properties in common with the compounds known as alkali silicates.

In practice silica sol and more specifically by way of example, "Ludox" is mixed in the approximate ratio of one part "Ludox" to six parts demineralized water. It is used in our normal practice at room temperature for convenience although other temperatures can be employed. Also the concentration recited above is convenient for applying the material; however, this may also be widely varied within the scope of the invention.

In a preferred way of carrying out the invention, the soleplate 2 is at least partially masked as indicated diagrammatically by 4 to cover the surface adjacent the boiler cavity 3. The surface of the cavity is unshielded by the masking member so that the coating material may be applied in any suitable manner, preferably by spraying onto this surface. The coating composition is applied to the boiler cavity 3 from a spray device indicated generally at 5. Since the particular apparatus forms no part of this invention, a spray device has been illustrated only diagrammatically to indicate generally one way of applying the coating material.

It has been found that superior results are obtainable when the ultimate coat is secured by a plurality of individual thin coats applied to the boiler surface. The soleplate is heated to a temperature above the boiling point of water in order to assure the evaporation of the water from the silica sol leaving an adherent coating of silica on the boiler cavity surface. There is a relatively wide range of temperatures which may be employed for the soleplate, the minimum temperature being above the boiling point of water or other dispersion medium used in the coating material. In practice a temperature of about 400 degrees F. is employed since this facilitates the rapid evaporation of the water content of the coating composition, and ensures that the soleplate will remain well above the boiling point of water throughout the coating operation. As indicated above, the use of a plurality of relatively thin coats is preferred and has secured the most satisfactory results. Each coat is allowed to dry, or at least to set partially, before the next coat is applied. For this reason, it is advantageous to use a soleplate temperature substantially above the boiling point of water since this facilitates the evaporation of the water and the drying of each coat so that the next coat may be more quickly applied. In practice the soleplates are preheated in a conventional oven to a temperature of 500 degrees F. or more, so that the soleplate will remain well above the boiling point of water throughout the application of the plurality of coats of the coating material. It will be apparent, of course, that, if desired, the soleplate could be heated in any suitable manner during application of the coating material to evaporate the liquid medium, but the preheating of the soleplate has been found to be more convenient.

In actual practice some thirty successive thin coats are employed to secure the final coating on the boiler surface. At the temperature employed for the soleplate and with the very thin individual coats applied, there is a quick drying so that each successive coat may be very quickly applied over the preceding one. While, as indicated above, in actual practice a large number of quite thin coatings is employed the specific number is not critical. A single coat can be employed if desired or any selected number of coats can be employed. However, as indicated above, it has been found that superior results are obtained by applying a plurality of relatively thin coats rather than by attempting to secure the ultimate thickness in a single coat.

What we claim is:—

1. A steam iron soleplate having a boiler cavity therein for receiving water for flash conversion into steam provided with an adherent coating of silica on the surface of the cavity.

2. A steam iron soleplate having a boiler cavity therein for receiving water for flash conversion into steam provided with a coating on the surface of the cavity comprising dried silica sol.

3. A steam iron soleplate having a boiler cavity therein for receiving water for flash conversion into steam provided with a coating on the surface of the cavity comprising a plurality of coats of dried silica sol.

4. In the manufacture of a steam iron sole-

plate as claimed in claim 1 or 2, the method of coating the surface of the cavity which comprises applying a colloidal dispersion of hydrated silica in a liquid medium to the surface of the cavity, and evaporating the liquid medium.

5. In the manufacture of a steam iron soleplate as claimed in claim 3, the method of coating the surface of the cavity which comprises spraying onto the surface of the cavity in a plurality of coats a colloidal dispersion of hydrated silica in a liquid medium, and evaporating the liquid medium after each coat and before the application of the next succeeding coat.

6. The method claimed in claim 4 or 5 in which the liquid coating composition comprises 30% hydrated silicon dioxide in colloidal dispersion.

7. The method claimed in claim 4 or 5 in which the liquid coating composition comprises approximately 30% hydrated silicon dioxide in colloidal dispersion from 0.3% to 1% Na_2O and up to 0.15% Na_2SO_4.

8. In the method of coating the surface of the cavity as claimed in any of claims 4-7, heating the soleplate above the boiling point of the liquid medium to cause evaporation of the medium.

9. The method claimed in claim 8 which comprises heating the soleplate to a temperature of about 400 or 500 degrees F., prior to applying the liquid medium to the surface of the cavity.

10. In the manufacture of a steam iron soleplate having a boiler cavity therein, the method of coating the surface of the cavity substantially as hereinbefore described.

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1 SHEET

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